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PULSED X-RAY APPARATUS, (U)

F/6 20/8

MAR 79 V A TSUKERMAN, N V BELKIN, V I KOLESOV
FTD-ID(RS)T-0251-79

UNCLASSIFIED

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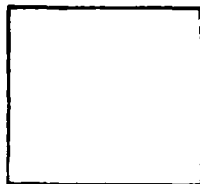


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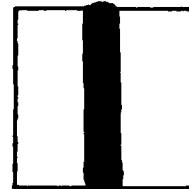
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INVENTORY

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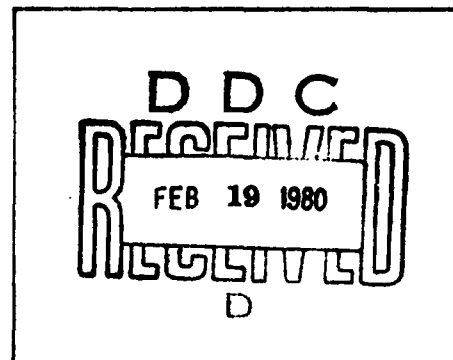
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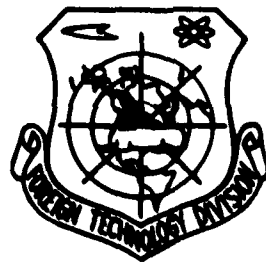
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PULSED X-RAY APPARATUS

By

V. A. Tsukerman, N. V. Belkin, et al



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79 08 20 182

EDITED TRANSLATION

FTD-ID(RS)T-0251-79 14 March 1979

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PULSED X-RAY APPARATUS

By: V. A. Tsukerman, N. V. Belkin, et al

English pages: 4

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pp. 1-2

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

| Block | Italic | Transliteration | Block | Italic | Transliteration |
|-------|------------|-----------------|-------|------------|-----------------|
| А а | А а | A, a | Р р | Р р | R, r |
| Б б | Б б | B, b | С с | С с | S, s |
| В в | В в | V, v | Т т | Т т | T, t |
| Г г | Г г | G, g | У у | У у | U, u |
| Д д | Д д | D, d | Ф ф | Ф ф | F, f |
| Е е | Е е | Ye, ye; E, e* | Х х | Х х | Kh, kh |
| Ж ж | Ж ж | Zh, zh | Ц ц | Ц ц | Ts, ts |
| З з | З з | Z, z | Ч ч | Ч ч | Ch, ch |
| И и | И и | I, i | Ш ш | Ш ш | Sh, sh |
| Й й | Й й | Y, y | Щ щ | Щ щ | Sheh, sheh |
| К к | К к | K, k | Ъ ъ | Ъ ъ | " |
| Л л | Л л | L, l | Ы ы | Ы ы | Y, y |
| М м | М м | M, m | Ь ь | Ь ь | ' |
| Н н | Н н | N, n | Э э | Э э | F, e |
| О о | О о | O, o | Ю ю | Ю ю | Yu, yu |
| П п | П п | P, p | Я я | Я я | Ya, ya |

*ye initially, after vowels, and after б, в, е elsewhere.
When written as ё in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

| Russian | English | Russian | English | Russian | English |
|---------|---------|---------|---------|----------|---------|
| sin | sin | sh | sinh | arc sh | sinh |
| cos | cos | ch | cosh | arc ch | cosh |
| tg | tan | th | tanh | arc th | tanh |
| ctg | cot | cth | coth | arc cth | coth |
| sec | sec | sch | sech | arc sch | sech |
| cosec | csc | csch | csch | arc csch | csch |

Russian English

rot curl
lg log

Committee on Inventions and Discoveries in the USSR
Council of Ministers

DESCRIPTION OF THE INVENTION
for the inventor's patent

Subject to Patent No. _____
Applied for 06.V.1970 (No. 1434861/26-25)
accompanied by application form No. _____
Priority _____
Published 21.VI.1971. Bulletin No. 20.
Date of publication of description 3.VIII.1971

International Classification of Patents N 05g 1/14
Universal Decimal Classification 621.386.14(088.8)

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Komyak, Ye. A. Feliks, Ye. I. Kotsarev, Ye. N. Sudarikov
and V. V. Bogolyubov

Applicant:

PULSED X-RAY APPARATUS

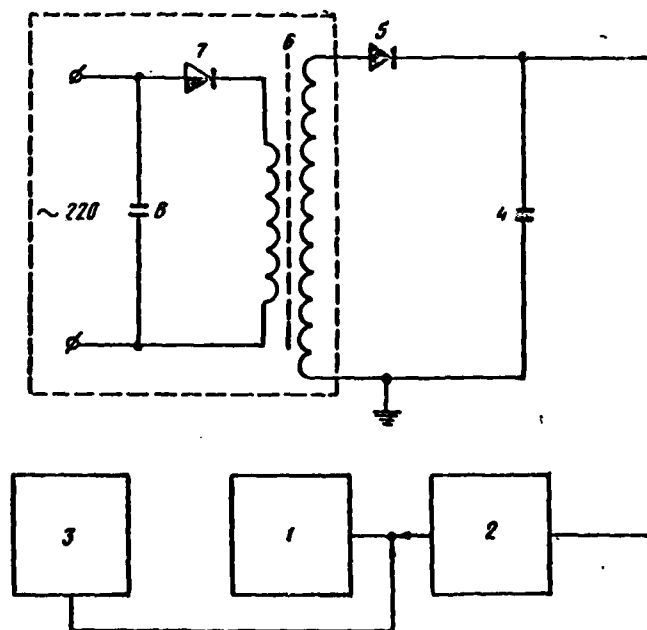
The present invention is concerned with x-ray apparatus, in particular with pulsed x-ray apparatus.

The familiar pulsed x-ray apparatus consists of a two-electrode tube with field emission, high-voltage pulse transformer, a reservoir capacitor and a device for charging the capacitor. Due to the use of pulse transformers as a source of high voltage, such equipment is distinguished for its comparatively small size and weight. However, further reduction in weight is limited practically by the presence of the device for charging the reservoir capacitor. This device is a step-up power transformer on an iron core. Another defect of the apparatus in question is that the reservoir capacitor

does not have a stable charging level. This has to do with the oscillations in the voltage supply and leads to a decrease in operating reliability.

The purpose of the invention is a further reduction in the size and weight of pulsed x-ray apparatus and an increase in the operating reliability of the reservoir capacitors. This is achieved by making the charging device of the apparatus in the form of a pulse transformer connected to an a.c. supply through a high-frequency oscillating circuit formed by a high-voltage capacitor, connected in parallel to the power supply and to the primary winding of the given pulse transformer, between which there is connected an uncontrolled switching diode.

In the drawing a block diagram of the proposed apparatus is shown, where 1 is the x-ray tube; 2 is the high voltage transformer; 3 is the device for starting the apparatus; 4 is the reservoir capacitor; 5 is the rectifier; 6 is the pulse transformer of the reservoir capacitor; 7 is the uncontrolled switching diode; and 8 is a low-voltage capacitor.



The apparatus operates as follows.

When the apparatus is connected to the a.c. supply line, the low-voltage capacitor 8 is charged to the amplitude of the supply voltage. At approximately this moment the switching diode 7 is actuated and the capacitor 8 is discharged through the primary winding of the pulse transformer 6. The discharge time, and consequently also, the period of the oscillations in the circuit formed by the capacitor 8 and the primary winding of the transformer 6, depends on the capacitance of the capacitor mentioned and the inductance of the transformer primary winding. In the secondary winding of the transformer 6 a short pulse of voltage arises which charges the reservoir capacitor 4 through the rectifier 5 to some initial value. These cycles occur with the frequency of the power supply, each time adding a new batch of energy to the reservoir capacitor until it is charged to the voltage determined by the transformation factor of the transformer 6. Since the actuation of the switching diode 7 always occurs for the same value of the voltage in the diode, the resulting value of the voltage in the reservoir capacitor 4 is also strictly constant and does not depend on changes in the voltage in the power supply.

When the starting pulse is fed from the trigger circuit 3, the reservoir capacitor 4 discharges through the primary winding of the high-voltage pulse transformer 2. In its secondary winding, a high voltage pulse emerges with approximately 150 kv amplitude, along whose forward front a vacuum breakdown in the x-ray tube 1 occurs, accompanied by a burst of x-rays.

Subject of the Invention

The pulsed x-ray apparatus containing a two-electrode x-ray tube with field emission, a high-voltage pulse transformer, a reservoir capacitor and a charging device, is distinguished by the fact that in order to reduce the size and weight of the apparatus, the charging device is made in the form of a pulse transformer connected to an a.c. power supply through a high-frequency oscillating circuit

formed by a low voltage capacitor connected in parallel to the power supply and the primary winding of the aforesaid pulse transformer, between which an uncontrolled switching diode is connected.

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